The definition of broadband:

The definition of broadband needs to include bandwidth, latency, and end-to-end reliability. An article in GigaOM might provide a good starting point::http://gigaom.com/2008/08/12/why-we-need-fat-pipes-the-top-5-bandwidth-hungry-apps/

"High-Definition Telepresence: This could be Cisco's product or another setup from a different vendor. The point is this: high-definition telepresence requires 24 Mbps and about a 50 millisecond latency to recreate the feeling of sitting in a room speaking with people."

Hgh-Definition Telepresence would seem to define a capacity that saturates the human senses. Our eyes and ears can absorb only so much information in a given instant in time. Other senses also matter, but my hunch is that their bandwidth needs are relatively smaller and will not dramatically change this. If our networks can deliver a high quality saturation level of input to an individual's senses, then efficient applications should be able to keep up and manage within that constraint. For example, we don't need to download HD detail for more than our eyes can process in an instant of time. As long as the input stream keeps up with our senses we should be ok.

If 24Mbps/50ms is sufficient for one person, then we can multiply that out for groups based on contention expectations. 25-100Mbps/50ms should meet the needs of homes. Businesses will often require more bandwidth.

Although reliability is mentioned in the public notice, the topic has received limited attention in the FCC workshops to date. Given the direction of internet-based applications for education, medicine, energy, public safety, homeland security, etc., our broadband network needs to be very reliable. T1 level reliability - which is on par with plain old telephone service (POTS - which is connected via copper wires) - seems like a reasonable starting point. This probably translates to 99.999% (5 mins/year) or similar. (T1 SLAs typically provide 99.99% uptime; however, in practice many

circuits are considerably more reliable).

Bottom line: a reasonable broadband target for the home might be: 25-100Mbps/50ms/99.999%

The byproduct of such a metric is that from a practical perspective, only fiber and copper wiring deliver "five nines" reliability. With rare exception, when you pick up a POTS phone, you get a dial tone and calls work every time. You expect clear voices and no drops. You don't have to make contingency plans for an important call. Problems that do occur can be isolated and fixed in a straightforward manner. Our electric power grid is another reference point. Although we have problems in some areas, most people do not need a generator or a UPS. When you flip the switch, power is there. As an aside, there's also a great deal of discussion around upgrading our grid to meet current and future needs. So, we recognize the need for reliable infrastructure.

In stark contrast, multi-point wireless technologies are 2-3 orders of magnitude less reliable. Interference, weak signals, wireless equipment problems in remote locations, and other service related issues are quite common. Many of these problems are difficult and expensive to diagnose and fix. David Pogue posted a short NY Times video in July that summed up the problems with wireless fairly well. Although the video focuses on cell phone service, similar issues affect WiFi, satellite, EVDO, WiMAX, LTE, and other wireless technologies. The last fifteen seconds of the video should resonate well with people dependent on wireless broadband technologies. http://video.nytimes.com/video/playlist/technology/david-pogue/1194811622273/index.html#1247463594936

Wireless technologies are a key part of our mobile society, and we are willing to trade the inherent lower reliability for the convenience they provide. They may also be a practical solution for some remote areas, and for the transition period to a robust broadband infrastructure.

However, given the future application demands and the cost of

upgrading our broadband infrastructure, we need to define forward looking bandwidth, latency, and reliability metrics and deploy solutions that will last for decades. We can't afford to rip the infrastructure out and replace it in five or ten years. Something on the order of proven fiber/copper technology with 25-100Mbps/50ms/99.999% seems appropriate.